
Appendix A

BATTERY OR PLATOON FIRE DIRECTION CENTER SOP

NOTE: The following SOP is to be used only as a guideline to help the FDO or fire direction section chief in developing an SOP for their unit.

The organization of the FDC generally is standard throughout the Field Artillery. The actual organization will vary depending upon unit size and their particular mission. However, the FDC in any unit must meet certain standards and be able to function on a continuous 24-hour basis. This requires that each individual within the FDC be cross-trained in every job in the FDC and understand that their primary function is to process all fire missions received with the maximum speed consistent with safety by using the most accurate data available, while ensuring necessary checks to preclude errors which might endanger friendly personnel. The FDC also receives operational and intelligence information for the platoon. In autonomous operations, the FDC will communicate directly with the observer in receiving the above-mentioned information.

A-1. Operational Concepts

The organization of the FDC must allow for the following goals to be accomplished:

- Continuous, accurate, timely, and safe artillery fire support under all weather conditions and terrain.
- Ability to engage all types of targets over a wide area.
- Massing of fires of all available units within range.
- Processing simultaneous missions.
- Dissemination of pertinent information.
- Efficient division of duties.
- Adherence to standard techniques and procedures.
- Teamwork and adherence to a definite specified sequence of operations to avoid and eliminate errors and to save time.
- Efficient use of communications.

A-2. Duties and Responsibilities Within the FDC

a. Fire Direction Officer.

- (1) Establishes, coordinates, and supervises the operations of the FDC.
- (2) Issues the fire order.
- (3) Ensures that the computer processes all fire missions with technically correct procedures.

(4) Reviews and approves the solution on all fire missions, to include any violations of safety data.

(5) Develops and enforces fire command standards and ensures that proper fire commands are transmitted to the cannon sections.

(6) Ensures that ammo distribution is maintained correctly within the platoon and notifies the platoon leader if an ammo shift becomes necessary.

(7) Ensures that the FDC maintains current tactical data on maps and charts.

(8) Ensures that firing unit and ammo status are reported to the battalion FDC.

(9) Supervises the preparation for and execution of prearranged fires.

(10) Computes all safety data, to include verification of the platoon leader's minimum quadrant elevation.

(11) Analyzes intervening crests.

(12) Establishes and maintains communications.

b. Chief Fire Direction Computer (USMC--Operations Chief).

(1) Responsible for the training of all personnel within the FDC.

(2) Ensures that the FDC is prepared within Army training and evaluation program (ARTEP) (Marine Corps combat readiness evaluation system [MCRES]) standards to fire missions with the most accurate data available.

(3) Supervises the preparation of the firing chart(s). Ensures that chart checks are performed and are within tolerances between both the horizontal and vertical control operators' charts.

(4) Determines center range and charge for the computation of TGPCs. Ensures that TGPCs are correctly computed.

(5) Ensures that the safety box is correctly constructed.

(6) Supervises the installation of equipment in the FDC.

(7) Assumes the duties of the FDO in his absence.

c. Senior Fire Direction Specialist (USMC--Operations Assistant).

(1) Prepares the primary means for computing firing data and processes and records all missions fired on DA Form 4504.

(2) Transmits all firing commands to the howitzer sections in accordance with prepared fire command standards.

(3) Reports current firing unit and ammo status to the battalion FDC.

(4) Ensures that accurate information is maintained within the FDC.

(5) Ensures that all required equipment for processing missions is present and keeps the FDO and section chief informed of any shortages.

d. Fire Direction Specialist (HCO)(USMC--Fire Control Man).

- (1) Prepares the primary chart for operation. The HCO will determine range, deflection, and angle-T.
- (2) Assists the fire direction computer in manual fire direction procedures when necessary.
- (3) Updates the primary firing chart in accordance with the tactical situation.
- (4) Assists the section chief in installation of section equipment when necessary.

e. Fire Direction Specialist (VCO) (USMC--Fire Control Man).

- (1) Plots known data as directed by the assistant chief computer.
- (2) Plots the initial target location and subsequent corrections when received.
- (3) Checks chart data with the HCO.
- (4) Plots the initial target location on the situation map and determines and announces site for the appropriate battery.

f. RATELO/Driver (USMC--Fire Control Man/Driver).

- (1) Maintains the section vehicle.
- (2) Maintains the generator(s).
- (3) Helps the fire direction specialist in posting the current tactical situation on the situation map. Also, helps in maintaining in a current status all charts and records.
- (4) Operates and maintains the FDC radios.

g. Advance Party Man. Not mentioned above are the additional duties of the advance party man. This individual is normally selected and trained by the section chief. His duties areas follows:

- Prepares the position for the arrival of the FDC.
- Establishes wire communications with the aiming circle and the gun guides.
- Sets up the OE-254 antenna.
- Receives initial data from the aiming circle and inputs it into the BUCS computer.
- Establishes position voice communication with battalion.
- Guides the FDC vehicle into position.
- Helps set up camouflage nets.
- Ensures wire and radio communications are functioning properly. If they are not, he troubleshoots them.
- Sets up the second OE-254 as needed.

NOTE: Successful accomplishment of the battery fire direction mission depends on the fully coordinated efforts of all members of the FDC.

A-3. FIRE DIRECTION CENTER OPERATIONS CHECKLIST

The following checklists are provided to help the FDO or section chief in preparation and sustainment during any major field exercise.

a. Actions Before Departing Garrison.

(1) Design physical setup of the FDC to allow the FDO and section chief to observe the work of all personnel with a minimum amount of movement and provide each individual ready access to the equipment, forms, and information necessary to perform his duties.

(2) Ensure all necessary supplies and equipment are located within the FDC. (For a complete list of required equipment in a standard FDC, refer to the end of this appendix.)

(3) Ensure muzzle velocity logbook is present.

(4) Ensure adequate supply of expendable forms is on hand. The following forms are used in all FA units:

- DA Form 4982-R, *Muzzle Velocity Record*.
- DA Form 4982-1-R, *M90 Velocimeter Work Sheet*.
- DA Form 4504, *Record of Fire*.
- DA Form 4200, *Met Data Correction Sheet*.
- DA Form 3677, *Computer Met Message*.
- DA Form 3675, *Ballistic Met Message*.
- DA Form 5338-R, *Computer Checklist*.
- DA Form 4757, *Registration and Special Correction Work Sheet*.
- DA Form 4201, *High Burst (Mean Point of Impact) Registration*.
- DA Form 7353-R, *Universal Safety T*.
- DA Form 7352-R, *Copperhead Met + VE Work Sheet*.
- DA Form 4655-R, *Target List Work Sheet*.

NOTE: The following forms are only for use in 155-mm units:

- DA Form 5032-R, *Field Artillery Delivered Minefield Planning Sheet*.
- DA Form 5711-R, *Copperhead Planned Target List Work Sheet*.

(5) Ensure that the fire direction vehicle is loaded in accordance with your unit load plan. The load plan located at the end of this appendix maybe used as a guideline.

(6) Ensure the communications system has been verified as operational.

b. Actions Upon Occupation of a Position. These actions are not listed in any particular order and are as follows:

- (1) Establish voice communications with battalion operations center and the FDC, guns, and other subscribers; that is, observers and range control.
- (2) Verify the azimuth of lay with the platoon leader.
- (3) Transmit current update to battalion on firing unit and ammo status.
- (4) Establish fire order and fire command standards, and transmit them to the howitzer sections.
- (5) Maintain the muzzle velocity logbook.
- (6) Request observer locations.
- (7) Complete average site map.
- (8) Request current met.
- (9) Verify howitzer ammo count and whether or not the ammo status is readily available to the FDO and section chief.
- (10) Perform all necessary chart checks.
- (11) Compute safety and have a verification check completed as well.
- (12) Verify the platoon leader's minimum QE.
- (13) Verify the safety computed does not violate the platoon leader's minimum QE.
- (14) Ensure safety data have been posted within the FDC and distributed to all howitzer sections and leadership within the platoon.
- (15) Ensure the VCO's map is color-coded and marked for average site and altitude.
- (16) Compute TGPCs and special corrections.
- (17) Verify that all sensitive items are accounted for.
- (18) Verify GFT settings are applied to the GFTs.
- (19) Obtain an accurate propellant temperature and projectile weight.
- (20) Ensure situation map is readily available and posted with the current tactical situation and fire support coordinating measures.
- (21) Ensure the generator has been serviced and started.
- (22) Ensure after-operation checks have been completed on the FDC vehicle.
- (23) Ensure all howitzers have reported safe and in order.
- (24) Check for intervening crests.

chart: (25) Check the following to ensure that they are plotted correctly on the firing

- Center of battery location or base piece and altitude.
- Azimuth of fire.
- Azimuth and deflection indexes,
- Safety box.
- Observer locations.
- Fire support coordinating measures.
- Frontline of troops.
- Radar.
- Other batteries within the battalion.
- TGPC sectors if applicable.

(26) Ensure the firing chart is neat and clean.

(27) Ensure the chart is prepared for 6,400-mil operation, if necessary.

(28) Ensure the five requirements for accurate predicted fire have been met.

(29) Ensure a wet code has been requested for live fire from range control.

(30) Ensure the FDC is neat and orderly with equipment readily available but stored so as not to interfere with the FDC operations.

(31) Ensure fire order and fire command standards are visible to all personnel.

(32) Ensure the following information is easily accessible.

- Laying data.
- Piece distribution.
- MV information.
- Call signs.
- Residuals.
- GFT settings.
- Propellant temperature.
- Projectile weight.
- Terrain gun position corrections.

c. **Actions Upon Receipt of a Fire Mission.** Upon receipt of a fire mission, the FDC does the following:

RATELO: Records CFF and announces **FIRE MISSION** to the FDC.

ALL: Announce **FIRE MISSION**.

COMPUTER: Announces **FIRE MISSION** to gun line.

RATELO: Announces (or records on mission board) the CFF to the FDC (loud readback to FO).

HCO: Reads back target location, plots target, and determines chart range and deflection.

VCO: Plots target and determines chart range and deflection.

FDO AND SECTION CHIEF:

1) Plot the target on the situation map and verify it is safe and does not violate any FSCMs.

2) Determine the fire order and issue it to the computer.

COMPUTER:

1) Reads back the fire order and records it on ROF.

2) Records initial fire commands up to and including fuze on the basis of the FDO's fire order.

3) Announces initial fire commands to the guns. (FDO and section chief monitor.)

RATELO: Composes and transmits the MTO on the basis of the fire order. (FDO and section chief monitor.)

COMPUTER: Requests range; for example, **RANGE, ONE ALPHA**.

HCO: Announces chart range to the computer; for example, **ONE ALPHA, RANGE 5980**.

VCO: Announces **CHECK** or **HOLD** (± 30 meters) to HCO.

COMPUTER:

1) If the VCO announces **CHECK**, places announced range under MHL on appropriate GFT. If the VCO announces **HOLD**, has the section chief verify charts and determine which range to use.

2) Records and reads back range placed on GFT; for example, **RANGE 5980**.

3) Requests deflection; for example, **DEFLECTION**.

HCO: Announces chart deflection to computer; for example, **DEFLECTION 3286**.

VCO: Announces **CHECK** or **HOLD** (± 3 mils) to HCO.

COMPUTER:

1) Records chart deflection on ROF and reads back chart deflection.

2) Records elevation on ROF.

3) If time or VT fuze is used, determines time setting.

4) If time or VT fuze is used, announces **FZ TI (or VT), TIME (such-and-such)** to gun line and records on ROF.

5) Determines deflection correction and records it on ROF.

6) Determines deflection to fire.

7) Announces deflection to fire as **DEFLECTION (so much)** to the gun line and records it on ROF.

FDO AND SECTION CHIEF: Ensure all data determined by computer are correct. (May follow with TFT and GFT or BUCS.)

VCO: Determines and announces site. (FDO and section chief perform common-sense check [VI/RG in thousands].)

COMPUTER:

1) Records site on ROF.

2) Determines QE and records it on ROF.

3) Announces data to FDO and section chief for safety verification.

FDO AND SECTION CHIEF: Verify the data from the safety T are safe. If the data are safe, announce **SAFE**. If the data are unsafe, announce **UNSAFE** and state the reason why; for example, **UNSAFE, QE 3 MILS BELOW MIN SAFE QE**.

COMPUTER:

1) If data are safe, announces QE to the gun line.

2) Records MOF I/E, if applicable, as announced in the fire order.

3) Maintains the ROF.

HCO AND VCO: Orient target grid on firing charts and await any subsequent corrections from the observer.

VCO: Updates ammo board as time permits.

d. Actions During Fire Missions. These actions areas follows:

(1) Verify the met was valid with registration.

(2) Ensure safety data have been updated after the registration mission.

(3) Ensure situation map has been checked for occupation of intervening crests by friendly elements.

(4) Verify fire order has been issued.

(5) Ensure the fire mission is from a valid subscriber.

(6) Authenticate the call for fire, if necessary.

(7) Ensure the current communications-electronics operation instructions (CEOI) are available.

(8) Ensure the MTO is transmitted promptly and in accordance with the fire order.

(9) Ensure fire commands are being transmitted as soon as individual items are determined and that they are in the correct format.

(10) Ensure ammo count has been updated after every mission by piece.

- (11) Verify how old met data are.
- (12) Complete a chart-to-chart check on firing data for each mission.
- (13) Check safety on each and every mission.
- (14) Determine angle T and, if necessary, transmit it to the observer.
- (15) Properly update safety.
- (16) Ensure proper reports are given to the battalion FDC and tactical operations center (TOC).
- (17) Ensure current situation map has been updated lately to reflect the current tactical situation.
- (18) Ensure the record of fire is legible and complete.
- (19) Ensure propellant temperature has been updated within the last hour.
- (20) Ensure the communications system allows all personnel to hear the call for fire.

e. Actions Before Displacement. These actions areas follows:

- (1) Ensure FDC is set up for emergency missions.
- (2) Clean off old GFT settings from GFT.
- (3) Ensure start point has been reported to battalion.
- (4) Ensure communications check has been performed with battalion while moving.
- (5) Ensure all sensitive items have been accounted for.
- (6) Ensure chart has been prepared for the next position.
- (7) Ensure checkout information has been obtained from range control.
- (8) Always keep copies of ROFs and safety computations for permanent records.
- (9) File forms in an orderly manner.

A-4. Fire Direction Center Journal (Logbook)

To maintain a record of FDC activities during field operations, it is recommended that a journal be kept of each day's activities. This journal, or logbook, will reflect all significant events that have occurred during all field operations. These significant events include, but are not limited to, the following:

- Check firings.
- Reports.
- All range control information.
- Receipt of all messages (date, time, and content).
- Met messages.
- The journal should be closed out every 24 hours so as to prevent any unnecessary confusion.

A-5. Fire Direction Center Equipment and Configurations

a. Although this appendix focuses on the manual FDC, it should be noted that the following is the priority in determining the method to be used in the computation of firing data.

(1) The lightweight computer unit (LCU)-BCS is the primary means of computing technical firing data within the platoon.

(2) The LCU-BCS-BUCS is the backup means of computing technical firing data.

(3) The ability to perform manual fire direction must be maintained to change to manual fire direction techniques at any time. Each FDC should maintain one firing chart with the appropriate fire direction equipment and manuals to support all manual cannon gunnery operations. The firing charts should serve as an emergency backup for BCS and BUCS,

b. Each FDC is authorized the following: fire direction set 3, artillery (NSN 1290-00-299-6892), 30,000 meters maximum range (line item number [LIN] H55843), 19200 (Table A-1); fire direction set 4, artillery (NSN 1290-00-299-6893), 15,000 meters maximum range (LIN H55706) (Table A-2); and plotting set, artillery fire control @JSN 6675-00-641 -3630) (LIN P09818) (Table A-3).

c. Figures A-1 through A-5 show suggested layouts of battery FDCs, including manual, automated, and howitzer improvement program (HIP) configurations. Applicability of these configurations will depend on the inherent mission and equipment of the unit concerned. Address questions or comments concerning these layouts to:

Commandant
US Army Field Artillery School
ATTN: ATSF-GSP
Fort Sill, OK 73503-5600

Table A-1. Contents of Fire Direction Set 3.

ITEM	NSN	QTY
Carrying case, field artillery fire direction center equipment: canvas, 60 inches long, 40 inches high, 8 inches thick, folded	1290-00-694-5190	1 each
Drawing board and trestle: 48 inches long, 36 inches wide, nonslope, folding trestle, 36 inches high	5675-00-248-1244	1 each
Plotting sheet 1,000-meter grid, 47 inches long, 35 inches wide	7530-00-656-0612	12 each
Protractor, fan, range-deflection: 30,000 meters range, 11834239(19200)	1290-00-266-6891	1 each

Table A-2. Contents of Fire Direction Set 4.

ITEM	NSN	QTY
Carrying case, field artillery fire direction center equipment: canvas, 45 inches long, 33 inches high, 8 inches thick, folded	1290-00-694-5191	1 each
Drawing board and trestle: 42 inches long, 31 inches wide	5675-00-248-1243	1 each
Plotting sheet 1,000-meter grid, 41 1/2 inches long, 30 inches wide	7530-00-656-0613	12 each
Protractor, fan, range-deflection: 25,000 meters range	1290-00-266-6890	1 each

Table A-3. Contents of Plotting Set.

ITEM	NSN	QUANTITY
Chest, plotting equipment: command post, 81349 C-12044, D7242-1	6675-00-561-0122	1 each
Map, tack, 1 1/8 inch (plotting needle) (100 per box)	1	2 boxes each color
Pad, writing paper: ruled two sides, white, 10 1/2 inches long, 8 inches wide, 100 sheets per pad, 12 pads per package (pkg), 81348 UU-P-21	7530-00-285-3038	1 pkg
Paper, tracing, high transparency, white: Substance 25 to 29 per 1,000 sheets of 17 X 22 inches; basic size 18 inches long, 12 inches wide, 100 sheets per pad, 81348 UU-P-00561 type III	7530-00-235-4033	1 pad
Substance 31 to 25 per 1,000 sheets of 17 X 22 inches; basic size 20-yard roll, 21 inches wide, 81348 UU-P-00561 type III	7530-00-236-9305	1 roll
Pencil: thin lead, wood-cased, class A: Blue 76364 mephisto 1345 Green 81348 SSP201 Orange 75364 mephisto 1343 Red 75364 mephisto 1340	7510-00-233-2027 7510-00-264-4610 7510-00-787-2430 7510-00-233-2021	1 dozen 1 dozen 1 dozen 1 dozen
Drawing, black, with eraser, FED spec SS-P-1605, number (no) H: No H No 3H No 5H	7510-00264-4614 7510-00-189-7881 7510-00-189-7883	1 dozen 1 dozen 1 dozen
General writing, black thin lead, medium hardness, no. 2, with eraser, 81348 SS-P-166 type IV	7510-00-281-5234	2 dozen
Glazed surface marking, extra thick lead, paper-cased: Black, 12 per package class C Blue, 12 per package class A Red, 12 per package class B	7510-00-240-1526 7510-00-436-5210 7510-00-174-3205	1 dozen 1 dozen 1 dozen
Pencil pointer: flint, 7 1/4 inches long, 1 1/4 inches wide, 1/8 inch thick, 81348 SS-P-551, type II	7510-00-237-4926	2 each
Plastic sheet: cellulose acetate, transparent, matte finish 1 side, colorless, 0.0075 inch thick, 20 inches wide, 50-ft roll, 81348 L-P-504, type I	9330-00-282-8324	1 roll
Plotting needle: red head, tapered shaft, 11/16 inch long, 0.020 to 0.030-inch diameter; 1 1/8 inches long, 4 per folder (package), 81349 FF-T-51	7510-00-851-9354	12 pkg
Protractor, semicircular: Brass: 4 1/4 inch, 1-degree graduations, numbered 0 to 180 degrees, 81348 GG-P-681, type I, class A, style 1	6675-00-641-3166	1 each
Plastic: 16-inch diameter; graduation units, mils, and meters; scales 1 to 25,000 and 1 to 50,000; 10-mil graduations numbered 100 to 3,100 mils; 81349 MIL-P-20385, type I	6675-00-556-0118	1 each
Scale, plotting: Plastic, flat, eight bevel, hollow square shape, graduation units, meters, and yards; scale 1 to 25,000 and 1 to 50,000; 4 inches square outside and 2 inches square inside; 81349 MIL-S-10987	6675-01-NIIN	4 each
Wood and plastic, triangular, relieved facet, graduation units, 1 to 25,000 yd, 1 to 25,000 meters, 1 to 50,000 and 1 to 62,500 inches and centimeters, 12 inches long; 81348 GG-8-161/7, shape D, notice 2	6675-00-283-0040	2 each
Sharpener, pencil: pocket size, draftsman's point cut, 75264 catalog no 1000	7520-00-227-1451	2 each
Shears, straight trimmers: steel blade and handle, sharp pointed blades, 9 inch, 81348 GGG-S-00278, type I, class 1 style A	5110-01-241-4373	1 each
Tape, pressure-sensitive adhesive: 0.75 inch nominal width, 72.00 yd nominal length; cellulose acetate film backing; transparent material; clear color, adhesive coating one side; 3.00 inch nominal core inside diameter; (58536) commercial item description (CID) AA-113, type II, class A; (78381) Minnesota Mining and Manufacturing Company, P/N 810, 0.75 inch wide, 72 yards long, or equal	7510-00-551-9824	2 rolls
Tape, pressure-sensitive adhesive: 1.00 inch nominal width, 60.00 yard nominal length; opaque material; natural color; adhesive one side; iner; 3.00 inch nominal core inside diameter; usage design for holding drawing board; (58536) commercial item description AA-194; (76381) Minnesota Mining and Manufacturing Company, P/N 230, 1.00 inch ide, 60 yards long, or equal	7510-00-198-5831	2 roots
Thumbtack: 0.312 inch nominal pin length, steel material; 100 per pack; (81348) federal specifications FF-T-311, type II, class 1	7510-00-272-6887	1 pack
Map tacks are a local-purchase item. Order from LABELON/GRAFFCO, #10 Chapin Street, Canandaqua, New York 14424. Order numbers by color are as follows: orange, LL01; red, LL02; blue, LL06; black, LL07.		

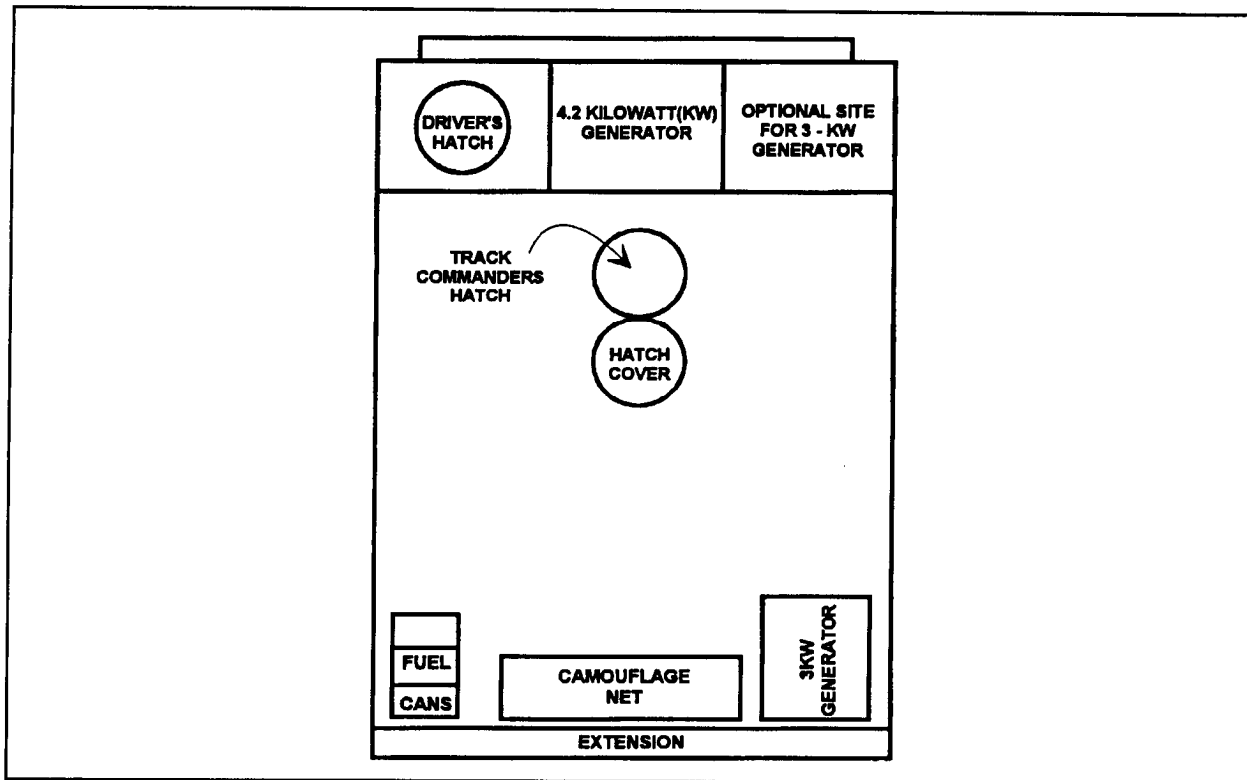


Figure A-1. External Top View of Battery FDC in an M577A1/A2 Command Post Vehicle.

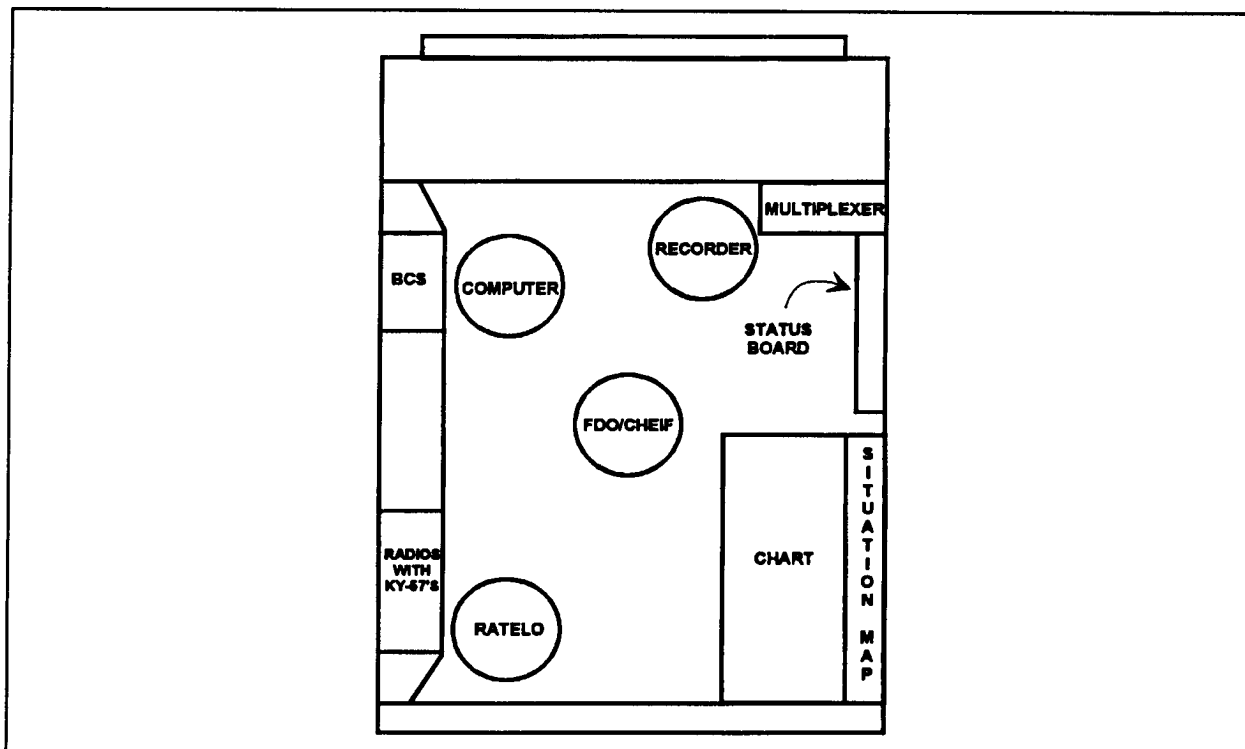


Figure A-2. Internal Top View of Battery FDC in an M577A1/A2 Command Post Vehicle.

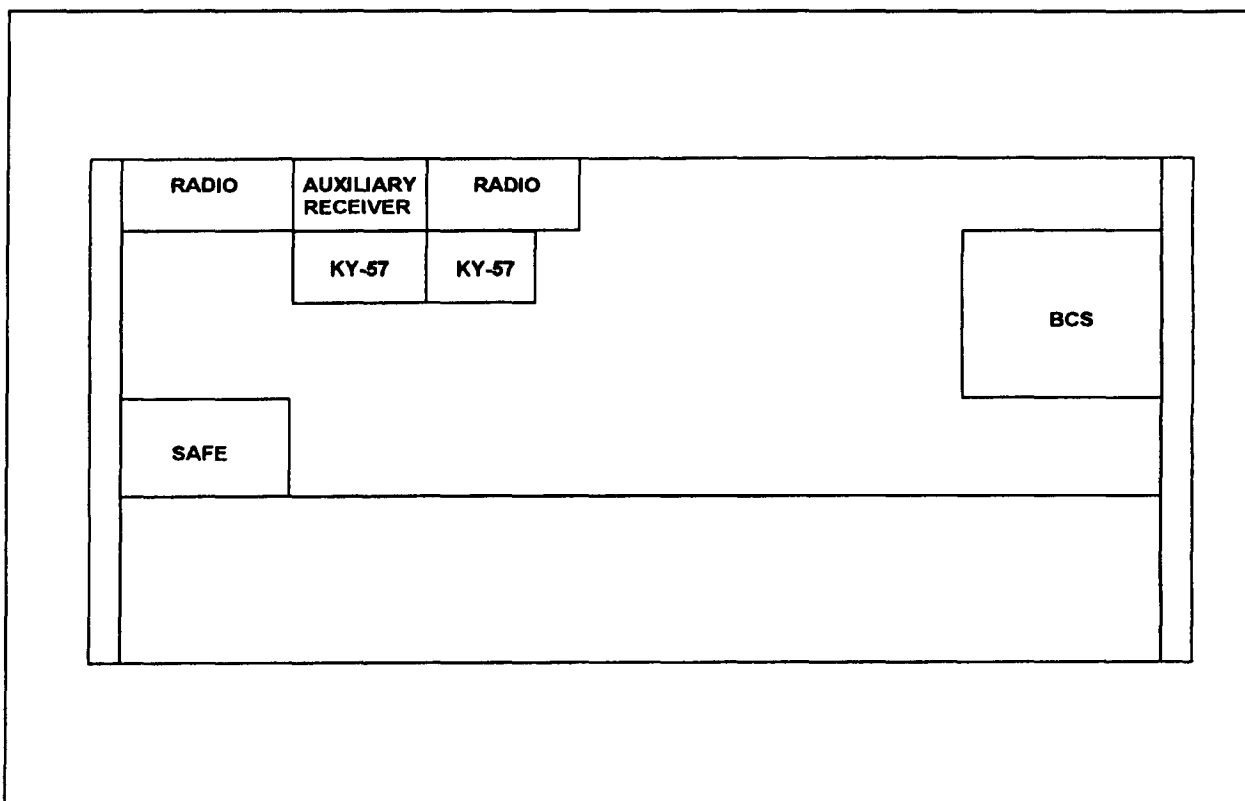


Figure A-3. Internal Left Side View, M577A1/A2.

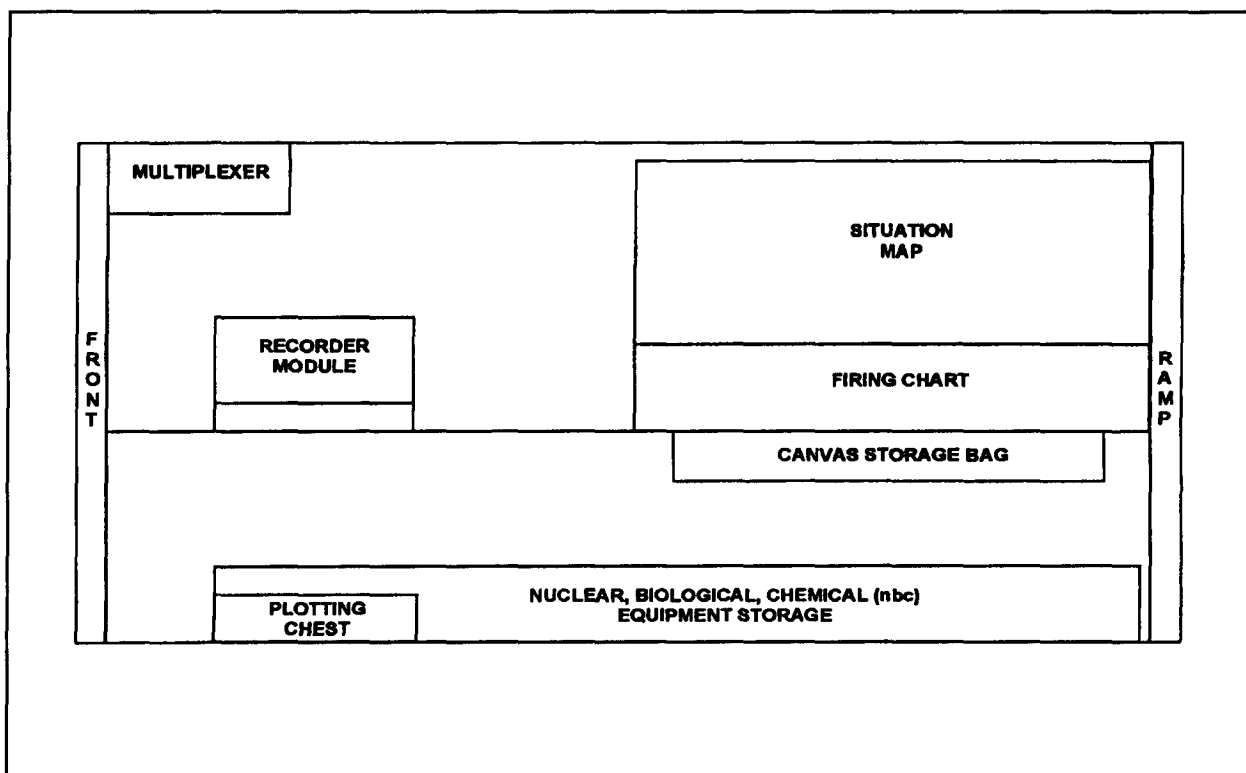


Figure A-4. Internal Right Side View, M577A1/A2.

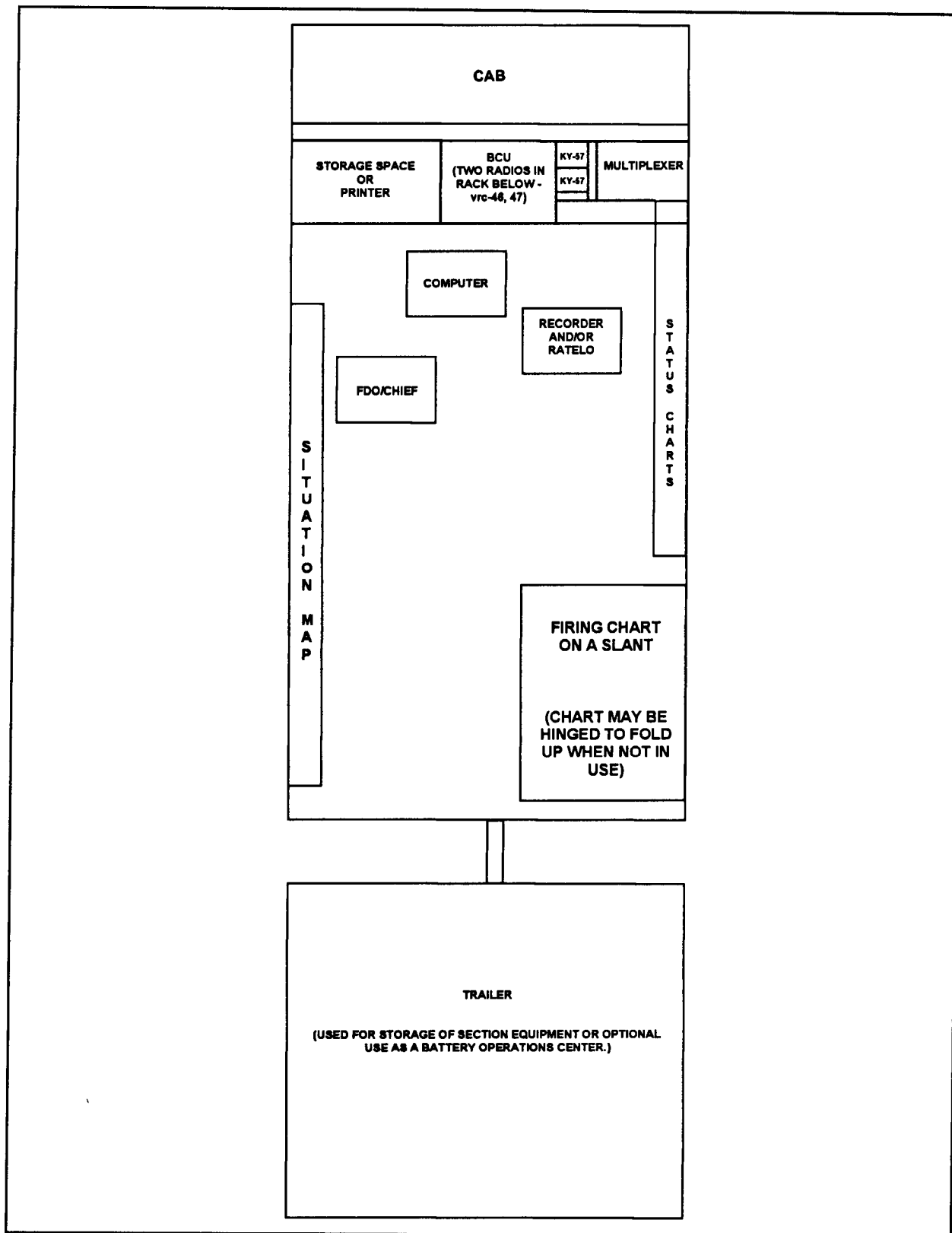


Figure A-5. Top View of Battery FDC in High-Mobility Multipurpose Wheeled Vehicle (HMMWV) or 2 1/2 Ton Truck.

c. Table A-4 shows a list of components needed for the FDC.

Table A-4. Components List.

NATIONAL STOCK NO	DESCRIPTION	UNIT OF ISSUE	QTY AUTH
9330-01-284-5609	PLASTIC SHEET: polyester resin matl; clear, film, natural color; 0.004 in. thk, 20.0 in w; 600 in lg; roll form; Transilwrap Co. of Philadelphia Inc. (30025) P/N PFilm, Polyester Film, .004 in thk; 20 in w; 20 ft, or equal Union Instrument Co./UIC Inc. (88997) P/N 87TG2, .004 in thk; 20 in w; 50 ft, or equal	RO	1
7510-01-269-3839	PLOTTING PIN: steel pin matl; plastic or glass head matl; 1-1/8 in. lg pin lg; 1/4 in. head dia; colors as specified; Spherical head shape; 50 per box; black; Moore Push Pin Co.(74083)P/N 807, or equal Labelon Corp.(83017)P/N LL07, black; or equal	BX	4
7510-01-269-3838	blue; Moore Push Pin Co.(74083)P/N 804, or equal Labelon Corp.(83017)P/N LL06, blue; or equal	BX	4
7510-01-269-9747	green; Moore Push Pin Co.(74083)P/N 806, or equal Labelon Corp.(83017)P/N LL04, green; or equal	BX	4
7510-01-269-3838	orange; Moore Push Pin Co.(74083)P/N 801, or equal Labelon Corp.(83017)P/N LL01, orange; or equal	BX	4
7510-01-269-3836	red; Moore Push Pin Co.(74083) P/N 802, or equal Labelon Corp.(83017) P/N LL02, red; or equal	BX	4
6675-00-283-0018	SCALE, PLOTTING: plastic matl; flat shape; eight beveled edge type; hollow sq view shape; two scales, 1:25,000 and 1:50,000 map ratio, inscription in meters; 4 in. sq o/a dim; Mil Spec(81349) MIL-S-10987 Allegheny Plastics Inc.(84010) P/N MIL-S-19087, plastic matl, or equal	EA	4
6675-00-283-0040	BOX WOOD SCALE: plastic and wood matl; triangular shape; relieved facet type; graduation units, 1:25,000 yd and meters; 1:50,000 and 1:62,500 in and cm; 12 in. o/a lg; FED Spec (81348) GG-S-161/7, type VII, shape 7, comp A, grade 2, size B, graduation 2, numbering A, style E, sheath 4 Sterling Mfg Co.(7D595) P/N GG-S-161/7, type VII, shape 7, comp A, grade 2, size B, graduation 2, numbering A, style E, sheath 4, or equal	EA	4
5110-01-241-473	SHEARS, STRAIGHT TRIMMERS: ambidextrous oper designed; 2 sharp point blades; CRES blade; rust-proof and no sharpening required; lightweight molded high impact plastic handle grips; 8.5 in. o/a lg; Alvin and Co. Inc.(23366) P/N 1093, or equal	EA	2

Table A-4. Components List (Continued).

NATIONAL STOCK NO	DESCRIPTION	UNIT OF ISSUE	QTY AUTH
7510-01-134-5506	PENCIL: 4H hardness; Berol Corp., Berol USA Div.(9V632) P/N E375-4H, or equal Faber Castell Corp. (32988) P/N 05014, or equal	DZ	2
7510-01-294-7979	6H hardness; Berol Corp., Berol USA Div.(9V632) P/N E375-6H, or equal Faber Castell Corp. (32988) P/N 05016, or equal glazed surface marking; thick marking core; spiral paper cased; Commercial Item Description (CID) (58536) A-A-87, type I, colors as specified; 12 per box;	DZ	2
7510-00-240-1526	black; Alvin and Co. Inc.(23366) P/N 173T, or equal Berol Corp., Berol USA Div. (9V632) P/N 173T, or equal	DZ	1
7510-00-436-5210	blue; Alvin and Co. Inc.(23366) P/N 168T, or equal Berol Corp., Berol USA Div. (9V632) P/N 168T, or equal	DZ	1
7510-00-174-3205	red; Alvin and Co. Inc.(23366) P/N 165T, or equal Berol Corp., Berol USA Div. (9V632) P/N 165T, or equal	DZ	1
7510-00-237-4926	PENCIL POINTER: 7.25 in. lg, 1.25 in. w, 0.125 in. thk; wood block and handle; twelve sheets of flint paper 1.25 X 4.0 in. o/a dim; Alvin and Co. Inc.(23366)P/N 3435, or equal colored; thin lead, wood cased, FED Spec SS-P-201 (81348) type I, class A, colors as specified;	EA	2
7510-00-233-2027	blue; Berol Corp., Berol USA Div. (9V632) P/N 758, or equal Faber Castell Corp. (32988), P/N 1276, or equal	DZ	2
7510-00-264-4610	green; Berol Corp., Berol USA Div. (9V632) P/N 739, or equal Faber Castell Corp.(32988), P/N 1278, or equal	DZ	2
7510-00-787-2430	orange; Berol Corp., Berol USA Div. (9V632) P/N 737, or equal Faber Castell Corp.(32988), P/N 1295, or equal	DZ	2
7520-00-233-2021	red; Berol Corp., Berol USA Div. (9V632) P/N 745, or equal Faber Castell Corp.(32988), P/N 1297, or equal	DZ	2
7510-00-264-4614	Lead drawing type; black color; w/ eraser; 12 per pkg; Commercial Item Description (CID) (58536) A-A-976 H hardness; Berol Corp., Berol USA Div. (9V632) P/N E375-H, or equal Faber Castell Corp.(32988), P/N 05010, or equal	DZ	2